PR151 NARRATIVE

Updated 17 May 2014

Cross section PR151 is located just upriver from a large outcrop of the Fort Union Formation that forms the right bank below the section (see photo files). The right bank of the cross section is on the Lightning-level terrace and the left bank is on the flood plain formed after the 1978 flood (Moody et al., 1999), which steps upwards onto a Moorcroft-level terrace (Moody and Meade, 2008) farther to the left. When the section was established in 1975, a small island was near the left bank and about 1.5 m above the thalweg of the main channel. Section PR151 was resurveyed annually during the 4 consecutive years 1977-1980, resurveyed in 1982, resurveyed annually during the 15 consecutive years 1984-1998, and, after a 13-year hiatus, was resurveyed in 2012.

The flood of 1978 eroded the right bank of the small island causing it to lower in elevation by about 30 cm. Additionally, substantial overbank sediment was deposited as lee dunes (Moody and Meade, 2008) downriver from cottonwood trees on the right bank. Between 1979 and 1984 the secondary channel separating the remnant of the small island from the left bank was filled in and a new floodplain surface was formed (Moody and others, 1999). This new surface accreted upwards by about 10 cm in 1987 and then again in 1993 when 10-20 cm, and in 1995 when 20-30 cm of sediment was deposited across the floodplain.

Little change was measured between 1995 and 2013. The major change was the appearance of possible bench-like features (Page and Nanson, 1982) along both banks that narrowed the width of the low-water channel.

Moody, J.A., and Meade, R.H., 2008, Terrace aggradation during the 1978 flood on Powder River, Montana, USA: *Geomorphology*, v. 99, p. 387-403.

Moody, J.A., Pizzuto, J.E., and Meade, R.H., 1999, Ontogeny of a flood plain: *Geological Society of America Bulletin*, v. 111, p. 291-303.

Page, K., and Nanson, G., 1982, Concave-bank benches and associated floodplain formation: *Earth Surface Processes and Landforms*, v. 7, 529-543.

PR151.
7 September 1975.
View downriver
through section.

PR151.
23 July 1977.
View upriver. Red line
is approximately on
line of section.

PR151. 25 May 1978.
Aerial view downriver
during waning stages of
the 1978 flood. Red
line is the approximate
line of section. White
areas show the extent
of sand newly
deposited by the flood
on floodplain and
terraces.

PR151. **Top**. 20 September 1994. Gravel pods deposited on the right bank about 100 m upstream from PR151 during an ice jam flood. Pods are on the higher Lightning terrace and on the floodplain about 2.5 and 3 m above the river bed. **Bottom.** 20 September 1994. Gravel pods about 30 m upstream from PR151 and about 3 m above the riverbed. One pod contains coal.

PR151. **Top**. 11 March 1995. View upriver with ice on floodplains. Red line is approximately on line of section. **Bottom**. 27 September 1995. View upriver. Red line is the approximate line of section. Crest of berm of newly (1995) deposited sand crosses the section at station 36. The same 'twin' butte is in the red circle in both photographs.

PR151. **Top**. 30 September 2013. View upriver standing on the line of section at station 43. The predominantly red vegetation is sedge (*Scirpus spp*.) growing closest to the water on a 'bench' below the level of the inset flood plain (green color). (see Moody et al., 1999, Ontogeny of a floodplain, GSA Bullentin 111(2), 291-303). **Bottom**. 30 September 2013. View downriver standing on the line of section at station 43. Red vegetation is sedge (*Scirpus spp*.).

PR151. **Top**. 30 September 2013. View upriver standing on the line of section at station 86. The predominantly red vegetation is sedge (*Scirpus spp*.) growing closest to the water on a 'bench' below the level of the inset flood plain (green color)--see plots in data file. **Bottom**. 30 September 2013. View downriver standing on the line of section at station 86.